State Water Resources Control Board

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TO: Dr. Gerald W. Bowes, Manager
Toxicology and Peer Review Section
DIVISION OF WATER QUALITY

FROM: Todd Thompson, P.E.
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DIVISION OF WATER QUALITY

DATE: February 16, 2007

SUBJECT: REQUEST FOR EXTERNAL PEER REVIEW OF THE RULE FOR ONSITE WASTEWATER TREATEMENT SYSTEMS

The Division of Water Quality requests that you initiate the process to identify reviewers to provide external peer review of the attached proposed regulations for onsite wastewater treatment systems (OWTS).

California has approximately 1.2 million OWTS that serve as sewage treatment and disposal systems for approximately 10% (3.4 million people) of the State's population. In several counties, more than 40% of the housing units use OWTS. Statewide, approximately 50% of housing units with OWTS rely on a domestic well for drinking water. Given such facts, the proper treatment and disposal of this wastewater is important because almost the entirety of it will pass through the soils underlying the OWTS to recharge groundwater. In addition, the State has identified several surface water bodies that are polluted where OWTS have been determined to be a contributing source of the pollution.

California is one of two states that do not have statewide regulations for OWTS. All but two of California's 58 counties have local requirements for OWTS. The proposed regulations, once adopted, would establish statewide minimum requirements for the design, operation and monitoring of OWTS. Development of the proposed regulations has been highly controversial.

The draft regulations are available for review now. We request that the review period be no longer than 45 days, and wish to receive all peer review comments by April 20, 2007, at the latest.

The State Water Board is expecting to release these draft regulations for the first public comment on or about May 15, 2007 for a 70–day public comment period. We expect to present these regulations for adoption at the November 2007 State Water Board Meeting.

We recommend that the State Water Board solicit reviewers with expertise in soil-based treatment of wastewater, wastewater treatment, and the fate and transport of pathogens (viruses and bacteria) and other contaminants in groundwater.

Additional background and summary information for the proposed regulations is provided in Attachment 1. The scientific portion of the proposed regulations include but is not limited to those listed in Attachment 2. Individuals involved in the development of the proposed amendment are identified in Attachment 3.

The staff contact for these regulations is Todd Thompson, P.E., who can be reached at (916) 341-5518 or via email at tthompson@waterboards.ca.gov. Please feel free to call me if you have any questions about this request, and thank you for your assistance.

Attachment 1: Background and Summary of the Proposed Regulations
Attachment 2: Scientific Portion of the Proposed Regulations
Attachment 3: Individuals involved in the Proposed Regulations

cc: Lisa Babcock
James Giannopoulos

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Attachment 1

ATTACHMENT 1: BACKGROUND AND SUMMARY OF THE PROPOSED REGULATIONS

On September 27, 2000, Assembly Bill 885 (**AB 885**) was chaptered into law, adding Chapter 4.5 (Section 13290 to 13291.7) to the Division 7 of the California Water Code (**CWC**). This law requires the State Water Resources Control Board to adopt regulations for the permitting or operation of onsite wastewater treatment systems (**OWTS**). In reference to the statute, the regulations or standards are required to include, but are not be limited to:

1. **MINIMUM OPERATING REQUIREMENTS;**

2. **REQUIREMENTS FOR OWTS ADJACENT TO IMPAIRED WATER BODIES IDENTIFIED PURSUANT TO SECTION 303(d) OF THE CLEAN WATER ACT;**

3. **REQUIREMENTS FOR AUTHORIZING A QUALIFIED LOCAL AGENCY TO IMPLEMENT THE REQUIREMENTS IN THESE PROPOSED STATE REGULATIONS;**

4. **REQUIREMENTS FOR CORRECTIVE ACTION WHEN OWTS FAIL TO MEET THE REQUIREMENTS IN THE PROPOSED REGULATIONS;**

5. **MINIMUM MONITORING REQUIREMENTS USED TO DETERMINE PERFORMANCE, IF APPLICABLE;**

6. **EXEMPTION CRITERIA TO BE ESTABLISHED BY THE REGIONAL WATER BOARDS;**

7. **REQUIREMENTS FOR DETERMINING A SYSTEM IS SUBJECT TO A MAJOR REPAIR.**

The proposed regulations provide for the following:

1. For new and replaced OWTS, require that the design and installation be done by a person technically qualified to recognize and respond appropriately to site-specific challenges including minimum soil depth requirements;
2. For all new OWTS, establish a minimum site review and regulatory process and minimum OWTS design requirements;
3. For new and replaced septic tanks, require an effluent screen to impede solids passing through from the septic tank to the dispersal field;
4. For all new OWTS, establish a third party certification process for proprietary supplemental treatment equipment, design requirements for non-proprietary

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supplemental treatment OWTS, and minimum performance requirements for OWTS using supplemental treatment;

5. For new and replaced OWTS, require that the system designer and/or installer to provide the site owner with an operation and maintenance manual;
6. For new and existing OWTS, require the system owner to monitor the septic tank solids levels every five years to ensure that pumping of the septic tank is done before solids begin to interfere with the operation of the OWTS;
7. For new and existing OWTS with onsite domestic wells, require the system owner to monitor the groundwater, every five years, and provide that information to the State Water Board. This requirement could be satisfied by monitoring the onsite domestic well;
8. For new OWTS with supplemental treatment components, require the system owner to arrange for a service provider to conduct maintenance on the system, in accordance with the owner's OWTS operation and maintenance manual;
9. For areas near an impaired surface water body, require existing OWTS to be replaced to meet the proposed performance requirements for OWTS with supplemental treatment components by a certain date and require new OWTS to be designed and built to meet those standards by a certain date that is earlier than the general application date for these regulations to new OWTS; and
10. Establish that the application of this regulatory scheme is the responsibility of the Regional Water Board, unless a qualified local agency enters into a formal written agreement or memorandum of understanding (MOU) to implement and enforce them.

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ATTACHMENT 2: DESCRIPTION OF SCIENTIFIC PORTION OF PROPOSED REGULATIONS TO BE ADDRESSED BY PEER REVIEWERS

The statute mandate for external scientific peer review (Health and Safety Code Section 57004) states that the reviewer's responsibility is to determine whether the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices.

We request that you make this determination for each of the following issues that constitute the scientific portion of the proposed regulatory action. An explanatory statement is provided for each scientific portion to focus the review.

An important caveat should be noted by the reviewers. The vast majority of existing OWTS are conventional systems (septic tank and dispersal system).

We anticipate that most new OWTS will be conventional systems due primarily to cost/affordability considerations. The proposed regulations include siting and design requirements for conventional OWTS that are intended to prevent surfacing effluent and achieve substantial reduction of pathogens (virus and bacteria) in the discharge from the OWTS dispersal system. With regard to other constituents in wastewater, soluble constituents that are not readily biodegradable, including nitrate in concentrations exceeding drinking water standard, will be found in the discharge from conventional system dispersal fields and will ultimately reach groundwater.

Scientific Portion of the Proposed Regulations:

1. **The regulations (§24901(c)(1 and 2)) would require that no person operate a new OWTS or increase the average pollutant loading to an existing OWTS with a design capacity to treat over 5,000 gallons-per-day without first notifying the Regional Water Board.**

   This requirement was requested by staff of the Regional Water Boards and is based on the existing requirement in the Central Valley Water Board's Water Quality Control Plan. The 5,000 gallons-per-day threshold is considered a large enough flow to warrant a closer review by Regional Water Board staff to determine whether or not specific waste discharge requirements (WDRs) should be issued for the OWTS. Such WDRs may be more stringent than required by the proposed regulations to ensure protection of human health and water quality.

2. **These regulations (§24901(c)(3)) specify that, if the waste type of the wastewater entering the OWTS is changed or if biochemical oxygen**

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demand (BOD) or total suspended solids (TSS) concentrations exceed 150 mg/L in the septic tank effluent and prior to discharge to the dispersal system, the OWTS owner must notify the Regional Water Board.

OWTS designed to treat a specific type of waste may not be capable of adequately treating other types of waste. Therefore, a change in waste type entering the OWTS may result in adverse effects to the OWTS. Wastewater application rates established in the proposed regulations assume a BOD and TSS waste strength. A change in wastewater strength entering the OWTS may adversely affect OWTS performance. After notification, the Regional Water Board would determine whether to issue specific waste discharge requirements that may be more stringent than required by the proposed regulations. This requirement is based on Table 4-3 on page 4-12 of the 2002 U.S. EPA Onsite Wastewater Treatment Systems Manual (EPA/625/R-00/008).

3. **The proposed regulations (§24910(t)) require all new septic tanks to restrict solid particles in excess of 1/8 inch in diameter from passing through to the dispersal field.**

   The particle restriction in the septic tank effluent is designed to prolong the life of the dispersal system. The specific size specification is based on effluent filters that are currently commercially available.

4. **The proposed regulations (24910(u and v)) would require owners of existing OWTS with a domestic well on their property to sample groundwater from a monitoring well downgradient and within 100 feet of the OWTS dispersal system every five years, and within 30 days of a new OWTS installation. Alternatively, the OWTS owner can elect to sample the onsite domestic well. The water sample would be analyzed for total coliforms and other constituents as specified in the Section and the results of the analysis reported electronically to the State Water Board.**

   Dissolved contaminant plumes from conventional OWTS are known to travel hundreds of feet and exceed drinking water standards. Thus the discharges from the vast majority of OWTS impair or threaten to impair the beneficial uses of groundwater in the immediate vicinity of the discharge.

   Local agency ordinances typically specify that domestic wells be installed no closer than 100 feet from any part of an OWTS. Domestic wells are known to be more vulnerable to surface contaminants than public supply wells due to less stringent and thus less costly construction standards. There are no requirements for owners of domestic wells to sample and analyze their well water.

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Analyzing for total coliforms would provide an indication of whether the well was vulnerable to pathogen contamination. Analyzing for minerals commonly found in water would provide information on the characteristics of the water and whether the water was being affected by wastewater constituents over time (with subsequent sampling and analysis).

Monitoring information would provide the owner with the quality of water being consumed. Such information would provide the Water Boards with information on the quality of groundwater in the vicinity of the OWTS discharge.

5. **A provision in proposed regulations (§24910(x)) "recommends" that water softener regeneration brine not be discharged to groundwater or OWTS**

   Note that this is a recommendation, not a requirement, and is intended to highlight the increase in the salinity of the OWTS discharge associated with regeneration brine. Additionally, the adverse affect of sodium on the dispersal system is described in Robert Patterson's Demonstration of effects on sodicity on soil hydraulic conductivity, Proceedings of conference on "Innovative Approaches to the On-site Management of Waste and Water." held at Southern Cross University Lismore, 26th of November, 1996.

6. **The proposed regulations (§24912) specify a protocol to determine the seasonal high groundwater level for purposes of OWTS siting (to establish the maximum depth of soil that remains continuously unsaturated in the proposed dispersal area).**

   This protocol is a technical interpretation and relies on similar protocols established in several county OWTS ordinances. Regional Water Boards would be allowed to establish an alternative protocol.

7. **Where a Regional Water Board requires OWTS to include disinfection to protect surface water or groundwater quality, the proposed regulations (§24913(c)) specify that OWTS supplemental treatment components must be designed to reduce total coliforms in the effluent.**

   - The level of total coliforms is used as a measure of pathogen quality for drinking water as listed in California regulations (Section 64426.1, Article 3, Chapter 15, Division 4, Title 22) and the State of Arizona OWTS regulations (R18-9-A312, Article 2, Chapter 9, Title 18).

   - The specific performance requirements in (§24913(c)) are intended to be equivalent to pathogen reduction obtained from a properly sited and designed conventional OWTS**.** The requirements are based on the State

of Arizona's OWTS regulations (R18-9-A312, Article 2, Chapter 9, Title 18).

8. **Where a Regional Water Board requires OWTS to remove nitrogen in order to protect surface water or groundwater quality, the proposed regulations (§24913(d)) specify that OWTS supplemental treatment components must be designed to reduce total nitrogen in the effluent to 10 mg/l.**

   The 10 mg/L effluent limit is based on the drinking water maximum contaminant level. Upon discharging to groundwater in a water table environment, contaminant plumes from OWTS tend to be long, narrow, definable, exhibiting little dispersion (2002 U.S. EPA Onsite Wastewater Treatment Systems Manual (EPA/625/R-00/008), pages 3-24,25). If the OWTS discharge is to a fractured rock environment, the discharge may travel considerable distances unpredictably with little or no dilution.

9. **The regulations (§24913(e)) specify a protocol for certifying supplemental treatment technology by third parties.**

   Third party certification is designed to screen out unreliable supplemental treatment technologies. The third party testing protocol outlined in §24913(e) is consistent with the protocol outline by the National Sanitation Foundation's Standard 40, but allows other independent third parties to certify supplemental treatment technologies.

10. **The proposed regulations (§24913(h)) require weekly operational inspections of disinfection supplemental treatment units.**

    The weekly inspection requirement is based on SWRCB Report No. 2006-1 and titled Evaluation of Disinfection Units for Onsite Wastewater Treatment Systems (located at http://www.waterboards.ca.gov/ab885/docs/disinfection.pdf).

11. **The proposed regulations (§24914(b)) require that all dispersal systems except seepage pits be sized using bottom area as the infiltrative surface.**

    This requirement is based on the 2002 U.S. EPA Onsite Wastewater Treatment Systems Manual (EPA/625/R-00/008), page 4-10.

12. **The proposed regulations specify maximum design application rates for sizing the dispersal systems in Figure 1 and Table 2.**

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Wastewater application rates are established for pathogen reduction and long-term unsaturated soil treatment of the wastewater and to prevent surfacing of OWTS effluent in the dispersal system. The wastewater application rates contained in Figure 1 and Table 2 are based on application rates specified in the North Coast Regional Water Board's Water Quality Control Plan (Basin Plan).

13. The proposed regulations (Figure 2, §24914(c) and 24914(d)) would require additional unsaturated soil depth where excessive rock fragments exist in the dispersal system.

The requirement is intended to compensate for soil displaced by rock fragments and accounts for the loss of surface area in the soil treatment media. This requirement is a technical interpretation and relies on several technical references including the Draft NOWRA Code (currently unavailable), Ver Hey, Margaret E. and Woessner, William W., Documentation of the Degree of Waste Treatment Provided by Septic Systems, Vadose Zone and Aquifer In Intermontane Soils Underlain by Sand and Gravel, Proceedings from the Fifth National Symposium on Individual and Small Community Sewage Systems; ASAE, 1987, and the OWTS regulations for the State of Wisconsin.

14. The proposed regulations contain a requirement (§24914(c)) for a minimum of 3 feet of unsaturated soil in the dispersal system to treat septic tank effluent in order to reduce pathogens.

The requirement for conventional OWTS is based on the 2002 U.S. EPA Onsite Wastewater Treatment Systems Manual (EPA/625/R-00/008), on page 3-33. The Manual cites studies demonstrating that normal operation of OWTS "results in the retention and die-off of most, if not all, observed pathogenic bacterial indicators within 2 to 3 feet of the infiltrative surface" in the dispersal system.

15. The proposed regulations contain a provision (§24914(d)) that allows using third-party certified wastewater treatment processes (supplemental treatment) as a surrogate for one foot of soil treatment (i.e. the regulations allow a minimum of 2 feet of unsaturated soil for OWTS with supplemental treatment rather than 3 feet of unsaturated soil required for conventional OWTS), provided that those processes meet performance requirements (§24913 (b), (c)) prior to discharge.

The proposed regulations would allow use of the lower end of the range cited above (i.e. 2 feet) provided that supplemental treatment components are used that achieve a biochemical oxygen demand (BOD) and total suspended solids (TSS) concentrations in the discharge to the OWTS dispersal field of 30 mg/L

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and 30 mg/L, respectively. This provision is intended for sites with limited unsaturated soil depth.

16. The proposed regulations (§24914(e)) would allow up to one equivalent foot (1.5 feet) of engineered sand fill (material specifications in Table 2) as a substitute for the lack of suitable native unsaturated soil below the OWTS.

- Use of sand fill for additional soil treatment and pollutant removal is based on multiple references including the USEPA, Onsite Wastewater Treatment and Disposal Systems Manual (EPA 625/1-80-012) October 1980.

- The fill specification (Table 2) is intended to ensure effluent treatment where native soils are lacking, including adequate retention for pathogen die-off. This is based from Converse, James C. and Tyler, E. Jerry, Wisconsin Mound Soil Absorption System: Siting, Design and Construction Manual, Small Scale Waste Management Project, College of Agricultural and Life Sciences, University of Wisconsin-Madison, 2000.

- The requirement that up to one foot of soil can be replaced with engineered sandy fill at a ratio of 1 to 1.5 (instead of 1 to 1) provides a factor of safety due to the porous nature of the fill.

17. The proposed regulations (§24914(g)) would allow design of gravel-less dispersal systems with a reduction (adjustment multiplier of 0.7) of the minimum required dispersal system area for effluent application.

The adjustment multiplier is based on work described in: R. Siegrist et. al, Wastewater Infiltration into Soil and the Effects of Infiltrative Surface Architecture, Small Flows Quarterly, Winter 2004, Vol. 5, No. 1.

18. The proposed regulations (§24914(h)) would require a minimum of six inches of soil over shallow subsurface dispersal systems.

The requirement to have a minimum of six inches of soil cover over the dispersal system is intended to establish a public health barrier and is based on Crites, R. and Tchobanoglous, G., Small and Decentralized Wastewater Management Systems, WCB/McGraw-Hill, 1998, page 925.

19. The proposed regulations contain conditions for the use and placement of seepage pits specified in §24914(i)(1 through 3).

The proposed regulations would allow seepage pits only where a qualified professional has determined that the site is unsuitable for other dispersal systems conforming to the requirements of the proposed regulations. These

requirements are based on multiple references including the 2002 U.S. EPA Onsite Wastewater Treatment Systems Manual (EPA/625/R-00/008) pg. 4-4.

20. **The proposed regulations (§24914(j)) require that evapotranspiration beds be designed to remove, without spilling over, all the expected wastewater generated at the site plus rainfall that is expected to have a return frequency of once every 25 years on annual, monthly and seasonal basis.**

    This requirement is based on technical interpretation of the State Water Resources Control Board's Guidelines for Evapotranspiration Systems, 1980.

21. **The proposed regulations in Article 4 (§24940) would require owners of OWTS within 600 lateral feet of an impaired water body, listed as impaired pursuant to §303(d) of the Federal Clean Water Act, to take specified actions where OWTS (in general) were identified as contributing to the impairment of the water body by the Regional Water Board. For purposes of this Section, impairment is limited to nitrate or bacterial contamination.**

    The proposed regulations establish a capture distance (600 feet) in lieu of a case-by-case determination of OWTS contribution through groundwater transport. The OWTS owner(s) would have the option of conducting a groundwater study to determine whether their OWTS impacts the impaired water body. The 600 feet distance is based on: California Department of Health Services (DHS), Drinking Water Source Assessment and Protection Program, Division of Drinking Water and Environmental Management, DHS, January 1999 >http://www.dhs.ca.gov/ps/ddwem/dwsap/DWSAP_document.pdf>.

    As detailed in the document (page 54), a radial distance established a microbial/direct chemical contamination zone to protect water supply from viral, microbial and direct chemical contamination. For porous media aquifers, 600 feet was the recommended minimum distance to be sufficiently conservative for protection from microbial contaminants (as well as chemical contaminants such as nitrate).

The Big Picture

Reviewers are not limited to addressing only the specific issues presented above, and are asked to contemplate the following "big picture" questions:

(a) Are there any additional issues that are part of the scientific basis of the proposed regulations that are not described above?

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(b) Taken as a whole, is the scientific portion of the proposed regulations based upon sound scientific knowledge, methods, and practices?

Reviewers should also note that some portions of the proposed regulations may rely significantly on professional judgment where available scientific data are not as extensive as desired to support the statue requirement for absolute scientific rigor. In these situations, the proposed course of action is favored over no action.

The preceding guidance will ensure that reviewer have an opportunity to comment on all aspects of the scientific basis of the proposed State Water Board action. At the same time, reviewers also should recognize that the State Water Board has a legal obligation to consider and respond to all feedback on the scientific portions of the proposed regulations. Because of this obligation, reviewers are encouraged to focus feedback on the scientific issues that are relevant to the central regulatory elements being proposed.

ATTACHMENT 3: INDIVIDUALS INVOLVED IN PROPOSED REGULATIONS

The overall establishment of these regulations was a long (5years), controversial, and involved process. Many drafts were generated and many drafts were scrapped. Consultation occurring over that same period during the process was also very involved. For the sake of being complete, State Water Board staff has taken special effort to identify everyone involved in the process of the time span, even though their contribution may have been limited with respect to the current draft rule. Their names are listed in several categories below. *Identification of any individual does not indicate a supporting or dissenting opinion regarding the proposed regulations.*

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